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Before the
FEDERAL COMMUNICATION COMMISSION
Washington, D.C. 20554

FCC 94- 12

DISPATCHED BY
In the Matter of)

Rulemaking to Amend Part 1 and Part 21) CC Docket No. 92-297 ✓
of the Commission's Rules to Redesignate)
the 27.5 - 29.5 GHz Frequency Band and) RM-7872; RM-7722
to Establish Rules and Policies for)
Local Multipoint Distribution Service)

SECOND NOTICE OF PROPOSED RULEMAKING

Adopted: January 19, 1994 Released: February 11, 1994

Comment Date: To be established; see paragraph 58.

Reply Comment Date: To be established; see paragraph 58.

By the Commission: Commissioner Barrett issuing a statement; Commissioner Duggan not participating.

I. Introduction

1. This Second Notice of Proposed Rulemaking addresses comments filed in response to the Commission's proposal to redesignate the 28 GHz band (27.5 - 29.5 GHz) from terrestrial point-to-point services, to terrestrial point-to-multipoint services.¹

2. In this action, we modify our prior proposal. In order to develop regulations for the use of the 28 GHz band that optimize the public interest benefits to the Nation, we issue concurrently with this action a public notice requesting comments regarding the establishment of a Negotiated Rulemaking Committee (NRMC). In particular, we seek to have the NRMC develop technical regulations reflecting a consensus determination whether proposed terrestrial and satellite uses can share, on a co-frequency and co-coverage area basis, the 28 GHz band. In the event that sharing is not possible for some of the proposed uses of the 28 GHz band, we request that parties provide detailed analyses of the costs and

¹ See Rulemaking to Amend Part 1 and Part 21 of the Commission's Rules to Redesignate the 27.5 - 29.5 GHz Frequency Band and to Establish Rules and Policies for Local Multipoint Distribution Service, CC Docket No. 92-297, Notice of Proposed Rulemaking, Order, Tentative Decision and Order on Reconsideration, 8 FCC Rcd 557 (1993) (hereinafter NPRM).

benefits of the various choices we can make for the use of this band.

3. All other issues pertaining to establishment of LMDS will await development of frequency coordination and sharing criteria for space and terrestrial services and technical parameters for the service.

II. Background

4. In the NPRM, the Commission considered three petitions for rulemaking proposing a redesignation of the 28 GHz band. That band currently is designated for fixed point-to-point and fixed satellite service use. We found that redesignation of the point-to-point use of the band to point-to-multipoint use could stimulate greater use of a band that largely has lain fallow. However, we asked for comment from satellite entities regarding the effect of redesignation on any proposed fixed satellite use of the band.

5. As requested by the petitions for rulemaking from Suite 12 and Video/Phone, we proposed that the 28 GHz band initially be licensed in two 1000 MHz blocks to two different carriers. Since it appeared that video service initially would be the primary service offered in LMDS, we proposed to divide each of the 1000 MHz bands into 50 channels of 20 MHz each.² We also proposed allowing licensees to provide a wide variety of other services.

6. We sought comment on whether other assignment schemes might better meet our objectives. We gave one example of a different assignment scheme, i.e. four blocks, two of which would have the capacity to carry 34 video channels, and two of which could be used for smaller video systems or telecommunications systems.

7. Finally, we requested comment on whether a separate assignment would be specifically required to accommodate the proposed satellite service applications in the Ka-band, or whether adequate coordination and sharing criteria could be developed to permit both terrestrial and fixed satellite services to operate compatibly in the band. We noted that the multicell multipoint configurations in the Suite 12 proposal envisioned a wide area

² Suite 12's analog technology requires 20 MHz of bandwidth for each video distribution channel; an allocation of 1000 MHz per licensee gives a 50 channel capability in one polarization and 1000 MHz in the other direction to each licensee. Polarization is an electromagnetic radiation phenomenon which enables re-use of the same frequency if the transmission isolation between opposite polarization senses (e.g., horizontal and vertical) is sufficiently high.

distribution of services that might make frequency sharing with other services impossible.

III. Discussion

A. Redesignation of the 28 GHz Band

1. Terrestrial technologies

8. Technological advances are making use of higher frequency bands possible. In the NPRM, we found that one of the petitioners for rulemaking in the 28 GHz band, Suite 12, appeared to have developed a technology that could lead to widespread use of that band. Suite 12's affiliate Hye Crest Management, Inc. (now CellularVision of New York or CVNY) had made use of experimental licenses and was given a standard license pursuant to waiver of the existing point-to-point rules in January, 1991 to provide a point-to-multipoint broadband video distribution service in the Brighton Beach area of New York City. We noted that CVNY had not yet shown market demand for its system in the New York City Primary Metropolitan Statistical Area (PMSA) for which it is licensed. Nevertheless, the more than 900 waiver applications we received from entities interested in providing the same type of service indicated that a significant market demand exists. Based on these applications, we found that there appears to be considerable commercial interest in using the spectrum for video distribution services, and we stated that a new source of competition to franchised cable companies, wireless cable companies, and other video service providers would further the public interest by promoting lower prices and new and innovative service offerings. We also noted that other uses of the 28 GHz technology were likely.

9. The majority of commenters and reply commenters support our finding of widespread interest in point-to-multipoint uses for the 28 GHz band. While some simply endorsed the proposal, others described in detail their plans for use of the band. Suite 12 states that the technology it proposes is capable of immediately providing interactive high quality video, voice, and data services. Suite 12 believes that LMDS will help meet the public demand for additional multichannel video programming and for two-way voice and data service. Suite 12 states that its system will compete with fiber cable services capable of delivering two-way interactive voice, video and data communications to the home; Suite 12 believes its system will benefit consumers with innovative service offerings at competitive prices. Suite 12 states that its system is capable of incorporating future technological advances such as high definition television and digital communications.

10. Video/Phone states that its Broadband NarrowBEAM Cellular Transmission Technology (BNCTT) will allow development of new, two-way broadband applications such as distance learning, telecommuting, telemedicine, videoconferencing at high speed data rates, business and professional television, halfduplex database services, and metropolitan area LAN interconnection. Video/Phone states that the lack of economical transmission capability at the local loop has hindered the growth of these services to date, which it believes would otherwise have been substantial. We interpret Video/Phone as promising that its system will benefit consumers with competitively priced, high-quality services with innovative applications for education, job training, health care and commercial telecommunications. Video/Phone plans to construct its system with a cellular frequency reuse pattern and make bandwidth available on demand based on customer needs. Another system developer is Gigahertz Equipment Company (GEC), which indicates that it is developing a digital system to provide video distribution in a cellular frequency reuse pattern. Many parties noted the potential for meaningful competition with franchised cable companies.

11. Other uses were discussed as well. Leaco noted that the long local loops required in its rural service area make fiber optics economically infeasible. It indicates that LMDS may be an economically practical broadband alternative for rural areas. Parties involved in public television are very interested in using the LMDS technology as last mile service in connection with the Clinton Administration's public policy goal of creating an information and education highway.³

2. Satellite technologies

12. The parties opposing redesignation of the 28 GHz band are primarily satellite entities, who argue that LMDS operations would cause unacceptable interference into fixed satellite services, including feeder links supporting mobile satellite service systems. Hughes and EMI state that LMDS should be assigned less spectrum than the two gigahertz proposed in the NPRM. NASA, Ameritech, Comsearch and Motorola Satellite argue that sharing may be difficult or impossible between satellite earth stations and LMDS omnidirectional formats, particularly if the service becomes ubiquitous in areas in which mobile satellite feeder links are located.

13. Most satellite entities indicate generally that although they currently do not use the Ka-band, they have been developing plans to use this band once the Ku and C bands are filled. NASA points out that its Advanced Communications Technology Satellite

³ See, for example, comments of America's Public Television Stations, et al., (Public TV).

(ACTS) is intended to explore commercial satellite uses for the Ka-band, and that it is premature to reassign a portion of the band for terrestrial use just as commercial satellite uses are being developed. NASA requests that the entire Ka-band be reserved for satellite commercial applications. Motorola Satellite states it requires 100 MHz of spectrum in the Ka-band for its proposed Iridium Low Earth Orbit (LEO) satellite system feeder link uplinks.⁴ Norris, Loral, and Calling also indicate that they may require some spectrum from this band for their fixed-satellite operations.⁵ A number of commenters representing satellite interests noted that the 28 GHz band is allocated internationally to satellite as well as fixed services. Parties argue, *inter alia*, that the United States should, in keeping with international agreement, maintain the satellite assignment of this frequency band. The specific proposals of the satellite interests are discussed below.

a. FSS proposals

14. NASA's ACTS Experiment. NASA has requested that its experimental ACTS system be allowed to continue without interference from LMDS. NASA is operating ACTS under a frequency usage support agreement from National Telecommunications and Information Administration (NTIA), which is accorded experimental status with this Commission. Normally, our practice is not to allow experimental licensees protection from interference. However, NASA requests that we protect its ACTS experimental services on the grounds that commercial uses for the spectrum are expected to grow directly from its experiments. NASA further supports its request noting that one billion dollars of taxpayer funds have been expended to bring this experiment about. NASA has requested that we not redesignate the 28 GHz band for 5 years to

⁴ Motorola Satellite's comments requested 200 MHz of spectrum for its proposed system's feeder links. In the MSS Above 1 GHz Negotiated Rulemaking conducted earlier this year to assist the Commission developing technical rules and policies for the 1.6/2.4 GHz mobile-satellite service, Motorola Satellite indicated that 100 MHz of spectrum would be sufficient. See NPRM, 8 FCC Rcd at 558, note 2.

⁵ After receiving authorization to use 29.5 - 30.0 GHz for its satellite uplinks, Norris petitioned us for authority to use 29.3 - 29.5 GHz as well. In our order denying this petition, we noted that Norris's operations in the 29.3 - 29.5 GHz band may conflict with LMDS, and we suggested that the issues pertaining to spectrum sharing between terrestrial LMDS and satellite uses should be resolved in the instant proceeding. Norris Satellite Communications, Inc., -- FCC Rcd -- (1993) (FCC 93-341), paragraph 4.

allow sufficient time for satellite communications services to develop.

15. Key experimental ACTS technologies include fast hopping spot beam antennas, onboard processing, and dynamic rain fade compensation. The fast hopping spot beam technology will enable spectral reuse, allow higher communications rates, including the T-1 rate, with Very Small Aperture Terminals (VSATs), permit use of smaller earth stations (Ultra Small Aperture Terminals, USATs), and enable efficient capacity assignment to geographically variable traffic loads. Onboard processing will introduce the ability to switch and route (on the satellite) at the individual voice circuit level, enable single hop mesh voice networks, and provide improved signal-to-noise ratios. The ACTS program is also investigating aeronautical mobile and mobile earth terminal uses, High Data Rate terminal applications and propagation phenomena and compensation. NASA and others supporting fixed satellite use of the band argue the ACTS system has the potential of producing significant long-term public benefits. These include preserving U.S. leadership in satellite technology and creating export opportunities, developing commercial applications that will permit innovative use that will stimulate demand and economic growth, and providing important services to underserved geographic areas. Specific applications include ISDN networks, supercomputer access, and rural electric power monitoring and operations.

16. Hughes application. Hughes Communications Galaxy, Inc. (Hughes) has requested authority to construct, launch and operate a two-satellite domestic fixed-communications satellite system, which it calls "Spaceway", to provide services in the Ka-band. Spaceway would use 1000 MHz (29.0 - 30.0 GHz). This spectrum presently is being used by ACTS. Hughes anticipates its system would follow the ACTS program, and would be located at approximately the same orbital position. Hughes indicates that the service would provide "new, innovative and affordable satellite services across the United States to a wide range of commercial and residential users. . . . The Spaceway system will be, in essence, a telecommunications superhighway in the sky. It will provide a wide range of video, audio and data services [I]t will complement, and provide an alternative to, many existing terrestrial services. The terrestrial telecommunications network is evolving to meet end user requirements for 'bandwidth-on-demand.' The Spaceway system will continue this evolution as it will be the first domestic communications satellite system to provide 'bandwidth-on-demand' capabilities."⁶ Specific applications Hughes envisions include video telephony, high speed access to computer on-line services, interactive access to

⁶ Hughes Application, filed December 3, 1993, at 1-2.

multimedia services, telecommuting and medical imaging services.⁷

b. MSS proposals

17. Feeder links. In 1991, the Commission initiated a proceeding to accommodate the establishment of a new non-geostationary satellite (low earth orbit or LEO) and/or geostationary satellite mobile-satellite service (MSS) in the bands 1610 - 1626.5 and 2483.5 - 2500 MHz (1.6/2.4 GHz bands).⁸ A total of six applications were filed, five proposing LEO satellite systems⁹ and one, filed by AMSC Subsidiary Corporation (AMSC), proposing to add additional frequencies to two authorized geostationary satellite orbit (GSO) MSS satellites.

18. An MSS system is comprised of three principal elements: the mobile subscriber transceivers which are used by end users, the satellite(s) with which those units interconnect, and the gateway earth stations which manage the network and interconnect with other networks. The system provides mobile terminal-to-satellite communications using mobile satellite service bands and satellite-to-gateway earth station (feeder link) communications using the fixed satellite service (FSS) bands. The satellite serves as a space-borne repeater relaying communications between subscriber terminals and the gateway earth stations. The gateway earth station, in turn, processes the information being relayed by the satellite and interconnects the processed communications with other terrestrial networks (e.g., the public switched telephone network) or with other subscriber units. Without the feeder links, an MSS system would be useless.

19. The six 1.6/2.4 GHz MSS applicants requested a variety of feeder link frequencies and bandwidths. Constellation, Ellipsat, and Loral each requested 66 MHz of feeder link spectrum in each transmission direction in the 5150 - 5216 / 6425 - 6725 MHz (5/6 GHz) bands. Motorola Satellite and TRW each requested 100 MHz in each transmission direction in the 19.4 - 20.2 / 29.1 - 30.0 GHz (20/30 GHz) bands, and AMSC requested an as yet undetermined amount of spectrum in the Ku-band (12/14 GHz).

20. In 1992 we established the "MSS Above 1 GHz Negotiated Rulemaking Committee" (NRMCC) to obtain expert advice and recommendations on technical and operational matters related to MSS

⁷ Id. p. 6.

⁸ Public Notice, Report No. DS-1068, 6 FCC Rcd 2083 (1991).

⁹ The five applicants are Ellipsat Corporation (Ellipsat), Motorola Satellite Communications, Inc. (Motorola Satellite), Constellation Communications, Inc. (Constellation), Loral/Qualcomm Satellite Service, Inc. (Loral), and TRW, Inc. (TRW).

in the 1.6/2.4 GHz bands.¹⁰ The NRMC analyzed the feeder link requirements and the Committee Report noted that the Federal Aviation Administration (FAA), a member of the committee, opposed the use of the 5 GHz frequencies for MSS feeder link use. The FAA is in the process of developing and implementing new navigation aids within the National Air Space System in this band. These include Differential Global Positioning System (DGPS), Terminal Doppler Weather Radar (TDWR) and Automatic Dependent Surveillance (ADS) of aircraft.¹¹ Accordingly, although we are continuing to pursue 5 GHz for MSS feeder link operations in inter-agency forums, the 5/6 GHz band is not now readily available for the feeder link requirements for MSS Above 1 GHz systems. Further, the prospect of finding suitable LEO feeder link frequencies below 15 GHz is not encouraging because most of the available FSS allocations are encumbered by existing domestic and international services or by other service limitations.¹² We tentatively conclude that if we are to proceed with licensing 1.6/2.4 GHz MSS systems, adequate feeder link spectrum must be identified and available.

21. The NRMC report evaluated the Motorola and TRW requests for uplink feeder links in the 20/30 GHz band. The NRMC Report noted that the requested uplink frequencies overlap frequencies being used or proposed for use by other services. The NRMC Report concluded, based on information in the Suite 12 Petition for Rulemaking, that the LMDS transmissions would cause unacceptable interference into LEO/MSS satellite receivers and that if feeder link earth stations were to be protected, LMDS would be unable to be implemented in major metropolitan areas. The NRMC Report concluded that LMDS should be excluded from the 28 GHz band.¹³

22. Since the 5 GHz band and other frequency bands below 15 GHz are not now available for LEO feeder link use, it appears that the most likely alternative at the present time is the 20/30 GHz band. In a Notice of Proposed Rulemaking adopted today, CC Docket 92-166, FCC 94-11, we state that we expect to be able to identify sufficient spectrum within the 27.5 - 30.0 GHz band to satisfy

¹⁰ Public Notice, Report No. DS-1265, 7 FCC Rcd 8614 (1992).

¹¹ NRMC Report at 30.

¹² For example, footnote US245 to the Table of Frequency Allocations, 47 C.F.R. Part 2, limits the use of certain fixed satellite service frequency bands to international systems subject to a case-by-case electromagnetic compatibility analysis.

¹³ NRMC Report at 32.

uplink feeder link requirements of all MSS Above 1 GHz licensees.¹⁴ Accordingly, by this action we are proposing that applicants' feeder link operations be included in the negotiated rulemaking process proposed herein.¹⁵

B. Shared Use of the 28 GHz Band

23. As an initial matter, it must be noted that the proposals before us are largely that. There is little evidence in the record regarding the likely public interest benefits of the various proposals, including increased access to high-quality, affordable and innovative services, and stimulation of economic growth through increased competition for existing services and introduction of new services that may be expected to stimulate demand and create jobs. Among the satellite proposals, NASA's ACTS program is in operation, but there is no recent information regarding its performance. Thus, the record does not indicate which of NASA's experiments have demonstrated commercial feasibility, or when an evidentiary base

¹⁴ Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610 - 1626.5 / 2483.5 - 2500 MHz Frequency Bands, Notice of Proposed Rulemaking, CC Docket 92-166, -- FCC Rcd --- (1994), FCC 94-11, adopted January 19, 1994, paragraph 76. The precise amount of spectrum will depend upon the number and capacity of systems that ultimately are licensed.

¹⁵ Hughes's Reply Comments suggested that LMDS should be allocated the 37 - 38.6 GHz band, which presently is allocated to private mobile services and point-to-point services. In comments filed November 3, 1993, "Licensee's Statement of Compliance and Request for Extension of Milestone Dates," File Nos. 54-DSS-P/L-90, 55-DSS-P-90, Norris argues that LMDS can successfully use higher frequencies in the 36 GHz and higher range. The Coalition to Preserve the Primary Status of the 27.5 - 29.5 GHz Band for Satellite Services (Satellite Coalition) argued in an ex parte communication that LMDS should be assigned the 40.5 - 42.5 GHz band. These arguments are unsupported. Unlike the 28 GHz band, no LMDS equipment manufacturer has suggested the use of this spectrum for LMDS, nor have we received any petition for rulemaking requesting redesignation of this frequency band by a prospective LMDS provider. See "LMDS Is Not Viable in the 40.5 - 42.5 GHz Band," ex parte presentation by Suite 12 on December 16, 1993. Accordingly, unless recommended otherwise by a consensus of a negotiated rulemaking committee, we will not grant further consideration to Hughes's and Norris's suggestion since there is no evidence in the record that the beneficial uses we anticipate from point-to-multipoint use of the 28 GHz band are likely to materialize at the higher bands.

from which to predict the benefits of its experiments is likely to be realized.

24. Among terrestrial proposals, we have granted one permanent and 12 experimental licenses to entities interested in developing service in the 28 GHz band.¹⁶ Only CVNY is operating in the band pursuant to regular license. We gave CVNY a license pursuant to waiver of our current rules governing the 28 GHz band so that it would be able to offer its point-to-multipoint video distribution service in the New York PMSA. At last report, however, CVNY is serving only about 200 subscribers. We have no data on whether LMDS is capable of providing viable competition to franchised cable television systems, nor whether it can provide service over a large geographic territory. No party is offering commercial two-way telecommunications service. The claims of LMDS developers for terrestrial service provision in the 28 GHz band remain unproven.

25. Only three experimental licensees have filed progress reports to date. None of the reports provides us with any information upon which to evaluate the success of their experiments. RioVision had not yet received equipment to begin experiments when it filed a status report in December, 1992. CVNY's and Video/Phone's progress reports briefly describe the areas in which they are conducting experiments.

26. Although there is little data from which to predict what would be the best licensing choice, our preference is to accommodate all potential users of the 28 GHz band, both terrestrial and satellite. This outcome would be in keeping with our responsibilities under Sections 1 and 7 of the Communications Act and would provide consumers with the maximum number of service choices to meet their needs.

27. Section 1 mandates that we "make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communications service with adequate facilities at reasonable charges. . .". 47 U.S.C. 151. Congress also requires us, through Section 7, 47 U.S.C. 157(a), to "encourage the provision of new

¹⁶ The experimental licenses allow the licensee to use the entire two gigahertz of spectrum in the 28 GHz band. Suite 12 holds one experimental license in Beverly Hills, and CVNY holds an experimental license in addition to its permanent license for the 27.5 - 28.5 GHz band in New York City. M3 of Illinois holds three licenses in Chicago, Elgin and Waukegan. RioVision holds a license in Brownsville as does the University of Texas - Pan American. Video Phone holds four experimental licenses in San Jose, Sunnyvale, Washington D.C. and Miami. In addition, NYNEX is authorized to use 27.5 GHz in White Plains.

technologies and services to the public." So important is this policy, Congress has enjoined that "[a]ny person or party (other than the Commission) who opposes a new technology or service ... shall have the burden to demonstrate that such proposal is inconsistent with the public interest." It has been our experience, in the nearly sixty years since the Communications Act was enacted, that accommodating new technology and service proposals serves these objectives. In our view, making the 28 GHz band available to all potential service providers would allow consumers to determine the best use of this spectrum. Accommodating all proposals would, we believe, result in the availability of maximum communications services possible at the lowest consumer prices possible.

28. Comments are mixed on the issue of whether LMDS and satellite services can coexist. The LMDS manufacturers Suite 12, Video/Phone, and GEC are emphatic that co-primary sharing is possible with feasible technical adjustments by both types of users. Satellite operators are equally emphatic that sharing is not possible. For example, NASA has provided a technical analysis critiquing Suite 12's system. NASA's analysis concludes that the system would cause and receive unacceptable interference to and from satellite links for a distance of 60 kilometers from LMDS hub transmitters. Suite 12 has responded ex parte with an analysis showing that NASA's assumptions are inaccurate and that the interference level generated would be below NASA's required sharing criteria. RioVision argues that NASA's analysis of the 28 GHz band shows characteristics virtually identical to 20 GHz propagation characteristics, and questions whether NASA's data came from experience at the higher frequency range. GEC states that the interference into the Iridium LEO satellite from LMDS transmitters would be negligible, and that sharing would be possible. Video/Phone proposes that sharing between Motorola's Iridium feeder links and 28 GHz point-to-multipoint applications is possible if feeder links are 60 miles from LMDS hub transmitters.

29. Comsearch states that the key element for any sharing is the realistic interference objectives and that it is necessary to have studies to determine the interference criteria, system compatibility and frequency coordination procedures. Comsearch proposes that the Commission work closely with industry experts to resolve disagreements in developing this information and to expedite the rulemaking process. Video/Phone recommends a Negotiated Rulemaking process for any technical issues that need to be resolved, including those raised by FSS system proponents.

30. The coordination issues involved in allowing all interested parties to use the 28 GHz band are highly technical, and their solutions depend upon the specific system design of various proposals to use the 28 GHz band. Moreover, these system designs and the supporting technologies are still in the developmental stage and the course of their development could be

influenced by our decisions in this proceeding. We believe that the best way to resolve the issues discussed here would be to establish an advisory committee to negotiate proposed regulations to govern this band.¹⁷

31. The negotiated rulemaking process is appropriate where:

- (a) there is a need for the rules to be developed;
- (b) there is a limited number of identifiable interests that will be significantly affected by the rules;
- (c) there is a reasonable likelihood that a committee can be convened with a balanced representation of persons who (1) can adequately represent the identifiable interests and (2) are willing to negotiate in good faith to reach a consensus on the proposed rules;
- (d) there is a reasonable likelihood that a committee will reach a consensus on the proposed rules within a fixed period of time;
- (e) the negotiated rulemaking procedure will not unreasonably delay the notice of proposed rulemaking and the issuance of final rules;
- (f) the agency has adequate resources and is willing to commit such resources, including technical assistance, to the committee, and
- (g) the agency will, to the maximum extent possible consistent with the legal obligations of the agency, use the consensus of the committee with respect to the proposed rules as the basis for the rules proposed by the agency for notice and comment. Negotiated Rulemaking Act Sec. 3, 5 U.S.C. 583(a).

32. This proceeding meets the determination criteria summarized above. Technical rules are necessary to establish under what circumstances, if any, sharing between satellite and terrestrial uses is feasible. The parties whose interests are affected are identifiable from comments filed in this proceeding. These interests can be adequately represented on a committee, and we believe that they will act in good faith to reach a consensus on technical rules within a set time frame. We believe that the negotiated rulemaking process will better use public and private resources than would our requiring more iterations of written

¹⁷ Pursuant to 5 U.S.C. 581, a public notice is being issued concurrently with this action requesting comments on the establishment of an advisory committee to negotiate proposed regulations.

comments until an adequate record is developed. We have adequate resources to commit to this endeavor and would use the consensus or report of the committee to develop proposed technical rules.

33. Thus, our initial determination indicates that the criteria for a negotiated rulemaking process are met in this situation. We request comment in response to the public notice, released concurrently with this action, which invites interested parties' comments on our proposal to use the Negotiated Rulemaking process. We believe this is the best way to accommodate all proposed uses of the band.

C. Choices for the 28 GHz Band

34. In spite of parties' best efforts, sharing may not be possible for all proposed uses. The technology required to permit sharing may not yet be developed, sharing efforts may result in unacceptable degradation of service to consumers, or sharing techniques may be prohibitively expensive, thus making an otherwise competitive service unaffordable to customers. In fact, at present it appears that sharing may not be possible under all circumstances proposed by the various parties interested in the 28 GHz band. For example, Hughes's proposal would place ubiquitous transceivers at subscriber locations in a manner similar to that proposed by Suite 12; under certain circumstances, MSS feeder link and FSS operations may interfere with and receive interference from LMDS operations. In addition, Calling Communications indicates that its yet-to-be filed application will be for services that cannot share spectrum with other satellite services nor with terrestrial services.¹⁸

35. The prospect that only some of the proposed services can be accommodated within the 28 GHz band leaves this Commission with the duty to choose which non-shareable services should be licensed. In order to make these choices, we require a record based on issues pertaining to the overall public interest in enabling only certain of the non-shareable services. Options for choosing among services include, but are not limited to, enforcing a particular modulation scheme for some or all users; segmenting the band to include as many services as possible with less spectrum than parties requested; assigning all spectrum to satellite uses; or assigning all spectrum to terrestrial uses.

1. Enforcing a prescribed modulation scheme.

36. If sharing between satellite services and present LMDS proposals is not feasible, our proposal for two 1000 MHz LMDS

¹⁸ Because Calling has not filed an application to construct, launch and operate a satellite system, we are unable to evaluate whether, or how, its proposal could be accommodated.

frequency blocks is not feasible unless we preclude satellite use. However, even if sharing is not feasible, it may be possible to accommodate equivalent LMDS uses in less than 2000 MHz if digital, instead of the proposed analog, technology is used. Our spectrum management obligations require that we maximize the public interest benefits that can be derived from the efficient use of the spectrum. A number of commenters recommend that we require digital technology, either directly by rule, or effectively by reducing the bandwidth of frequency blocks so that service providers must use digital technology. For example, Motorola suggests that future technological developments include additional alternative modulation technologies to allow broadband services in a fixed cellular reuse pattern within 250 MHz of bandwidth, so that the services described in the NPRM could be offered on a total of 500 MHz of spectrum by using a 4-cell reuse pattern on two 250 MHz bands, each split into separate cells by alternating vertical and horizontal polarization. Norris states that 1000 MHz of spectrum would support up to 664 high quality digital television channels, and argues that LMDS should be confined to half the proposed allocation.¹⁹ Video/Phone and GEC indicate that they are developing digital technology for services in the 28 GHz band.

37. Suite 12 and others, including individuals and small businesses, support the initial proposal. They argue inter alia that the Commission has erred in the past when it established new services, such as Multichannel Multipoint Distribution Service (MMDS) and Digital Electronic Message Service (DEMS), but failed to provide spectrum sufficient for licensees to offer a competitive service. They argue that the minimum competitive number of channels for wireless cable is fifty, and that this number of channels will require a full 1000 MHz of spectrum per licensee. Even the parties developing digital LMDS, Video/Phone and GEC, agree that a 1000 MHz allocation per licensee is necessary to accommodate Suite 12's analog technology.

38. In general, our licensing rules tend to favor techniques that permit licensees to use smaller increments of bandwidth to fulfill their service requirements because this enables us to accommodate more service providers and to facilitate competition among them. Competition tends to encourage efficient operation by licensees, and to produce lower prices, which in turn may stimulate demand for more services and may encourage the development of innovative, new services, maximizing the economic potential of the spectrum. With regard to LMDS, the same bandwidth can accommodate a greater number of video or telecommunications channels if a licensee uses a combination of digital modulation and compression rather than analog technology. If digital technology is feasible

¹⁹ Apparently, Norris's statement is based on a digital modulation scheme that produces at least 4 bits/sec/Hz or 6 MB/s per program channel for the level of signal quality noted.

in the 28 GHz band, it would appear that our regulatory objectives of maximum utilization and spectrum efficiency could be better served by allotting smaller frequency blocks for licensing. Moreover, if sharing with satellite entities is not feasible, smaller LMDS blocks may be a necessity.

39. We note that there is a trend in other radio communications systems toward the use of digital modulation techniques. Experience in other frequency bands has shown that where feasible, these modulation schemes are more spectrally efficient, less susceptible to interference, and offer greater system reliability. Field tests are underway to determine whether digital compression technologies can increase the efficiency of digital radio transmission systems. So far, tests have demonstrated that through digital compression, as many as 15 video programming channels may be possible on a single 6 MHz channel.²⁰ However, with this level of compression, some picture degradation occurs as an object's motion increases. Whether digital systems are economically feasible, or practical in LMDS field environments, is unproven. Nor is it clear when such systems would be available to provide service. On the other hand, digital systems would appear to facilitate interconnection with other digital networks and the overall development of digital products and services. This would seem to maximize the potential for economic growth.

40. In addition to addressing whether digital modulation techniques should be prescribed for LMDS, we also ask whether a particular modulation scheme should be prescribed for other users as well. For example, should all users of the band employ a code division modulation system? Would that enhance the potential for maximizing sharing opportunities in the band? What would be the costs and benefits of such an approach?

2. Segmenting the band.

41. Accommodating current and proposed satellite needs for the 28 GHz band may require 800 MHz (e.g., 28.7 - 29.5 GHz) of the total 2000 MHz proposed to be redesignated, assuming that accommodating satellite requirements precludes LMDS licensing in the same portion of the band, and further assuming that sharing between FSS and MSS feeder links is not feasible.

42. At present, it appears that there must be some separation in frequency or distance between LMDS and satellite service stations as currently proposed. The amount of these respective separations depends on interference objectives of both the LMDS and the FSS systems. The FSS may not be able to use the frequency bands effectively because LMDS systems are omnidirectional and

²⁰ Decathlon Communications, ex parte presentation, September 20, 1993.

because we intend that LMDS service be widely available.²¹ The FSS gateways proposed for LEO applications will require multiple moving antennas at an earth station site, sweeping the sky, following multiple LEO satellites simultaneously. Thus, coordination with a ubiquitous terrestrial system such as LMDS could be difficult, if not impossible, in some locations.²²

43. Finally, if band segmentation is necessary, we ask what an appropriate segmentation would be. For example, should the upper 800 MHz of the band (28.7 - 29.5 GHz) be reserved for satellite uses? Can MSS feeder link uses share with other fixed satellite uses? Can fixed satellite uses share with each other? What are the public interest and economic consequences of these choices?

3. Assigning all spectrum to satellite use.

44. This option would make the entire 28 GHz band available to satellite use only. The benefits of this option would be that satellite services would, as NASA requests, have additional spectrum for expansion as the Ku and C bands become saturated. The comments of the satellite parties provide a description of the new services and capabilities that are possible for satellite services in this band. The drawbacks of this option are that the proposed satellite services will not be available for some years, so availability of new services to consumers and any economic benefits to the Nation remain in the future. Moreover, satellite

²¹ Some satellite entities have expressed their concern that their use of the downlink at 17.7 - 20.2 GHz band will be foreclosed if they have no corresponding uplink spectrum available in the companion 27.5 - 30 GHz band. We realize that without spot beam antennas or other advanced technology to allow better frequency reuse for downlink channels, satellite entities will be limited to the same amount of spectrum for downlinks in the 17.7 - 20.2 GHz band as they have spectrum for uplinks in the 27.5 - 30 GHz band because uplink and downlink channels are paired. This is a further reason for satellite entities to assist in the development of sharing techniques and criteria; if the 28 GHz band is available for uplinks, then more of the 17.7 - 18.9 GHz band may also be used for downlinks, thus expanding the satellite entities' spectrum capacity.

²² Pursuant to Hughes's December 3, 1993, proposal, user stations would be ubiquitous because Hughes proposes to install earth stations at residential and business customer premises. The fact that both LMDS and FSS proponents wish to provide transmitting equipment at subscriber premises, and that the LMDS receivers will also be located at subscriber locations, compounds the sharing difficulties and would appear to require site-by-site frequency coordination for both services.

uses do not reuse frequencies as effectively as do terrestrial uses, so there may be fewer consumer applications possible than there would be if terrestrial uses also could be offered. Another drawback is, of course, that the terrestrial uses, which appear to be technologically feasible in the 28 GHz band now, either may never become available or may be considerably delayed while another block of spectrum is found and new technologies developed.

4. Assigning all spectrum to terrestrial use.

45. This option would make the entire 28 GHz band available to terrestrial use. The benefit of this option is that terrestrial service providers appear technologically capable of offering video service now, and may be capable of providing, with little delay, a wide variety of telecommunications services, including video telecommunications, distance learning, and broadband-on-demand. The potential for frequency reuse, and hence the ultimate number of service providers and customers who could be served, appears higher than that for satellite applications due to the probable use of cellular configuration and relatively small cells. Among the drawbacks of this option are that growth of the satellite industry may be significantly hindered, thus possibly injuring U.S. competitiveness in the world and harming an industry in which the U.S. is a world leader. In addition, NASA's ACTS program may be significantly constrained, and implementing a MSS service will be much more difficult.

5. Standards for determining which options will be used.

46. In order for us to promulgate final rules on use of the 28 GHz band, and to determine, if necessary, which services can and should be accommodated, we must have additional information. To that end, we are proposing a Negotiated Rulemaking Procedure so that proposed service providers may participate in making this information available. Specifically, we intend to ask the Committee to address the following issue:

What technical rules should be adopted for the Local Multipoint Distribution Service and/or the fixed satellite service so as to maximize the sharing of the spectrum among these services?

If the Negotiated Rulemaking Committee is able to accommodate all proposed uses of the band, we ask that it propose specific rules to effectuate a sharing plan. We ask that it provide an analysis of how benefits of its proposed solution outweigh other options for accommodating these services. Specifically, we ask that it explain:

- the proper definition of the product market and geographic market for the services proposed;

- the degree of competition anticipated within the relevant market (including the extent to which the proposed services are expected to compete with existing services);
- the degree to which new services and technological innovations will be stimulated by the proposed allocation;
- the amount and nature of investment in the national telecommunications infrastructure expected as a result of the use of the band for the particular services(s);
- the kind and number of jobs that would be created as a result of the licensing of particular services;
- any other available data concerning the economic growth expected to result from the allocation for the particular service(s).

47. In the event the Negotiated Rulemaking is unsuccessful in reaching a consensus regarding proposed technical rules that would accommodate the proposals before us, we require a record to enable us to select the best choices among services proposed. Assuming the Commission ultimately must select among service proposals for the 28 GHz band, the factors we will employ to do this will include:

(a) Economic growth potential: Which solution holds the greatest potential for stimulating lower prices and higher demand for services, and in what product markets and geographic markets? Which solution offers competition in existing markets, and which markets? Which solution best promotes increased efficiencies in spectrum usage, and permits the greatest number of service providers to operate commercially viable systems? Which solution best promotes the offering of new, high-quality and innovative services? Which solution promises to create the greatest number of high-paying jobs, and how? Which solution offers the greatest potential for maximizing interconnection of U.S. telecommunications services and facilities?

(b) Other public interest concerns that may not be readily calculable in economic terms: Which proposed plan appears most likely to make the most services, or the most valuable services, available to the broadest segment of the national community? What are the services, and to whom would they be available? Do any of the proposals promise needed services for unserved or underserved areas, and if so, what services, and to which communities would they be made available? Are particular services more likely to be valuable for educational, job training and employment applications, health

care, environmental or public safety uses? Do any of the proposals serve our goal of facilitating the development of a National Information Infrastructure, and if so, how?

(c) Timing: When are the services likely to become available, and when are the benefits they promise likely to materialize? If different benefits are likely to be realized at different times, what are the relative advantages of the short-term and long-term benefits of the various services proposed? For example, should we license a service that is likely to become available in one to two years, but outlive its usefulness in five to eight years, if doing so would preclude licensing a service that is likely to produce tangible benefits only after five years, but which benefits may be expected to have long-lasting impact on economic growth and other public interest concerns? What are the likely opportunity costs of not licensing the particular service for operation in this band? Are there any contingencies that would affect the likely offering of the proposed services in a timely manner, such as market entry barriers?²³

48. The proposed standards require quantification on the record in order for us to make decisions based on these factors. To that end, we request that commenters provide us with specific, detailed information that would permit us to base a decision on the public interest impact of various options. In particular, we require precise data on the exact nature of services proposed to be offered by each applicant, what entities would provide the services, the business plans of the service providers, and the expected primary and secondary benefits of the proposed services.

E. Summary and Conclusion

49. Pursuant to the Negotiated Rulemaking Act, we hereby propose to begin the process to decide whether we should implement a Negotiated Rulemaking Proceeding to allow interested parties to reach a consensus on methods to share the 28 GHz band. Accordingly, we are issuing today a public notice seeking comment on the establishment of a Negotiated Rulemaking Proceeding on this issue. If the comments support the establishment of such a proceeding, and if the General Services Administration gives its approval, a Negotiated Rulemaking Committee will be formed to consider the issues raised in this Notice, and specifically the questions raised in paragraph 46. Consistent with the Negotiated Rulemaking Act,

²³ The relative efficiency of spectrum use and reuse capability among service providers may also be a factor entering into any final decision.

in the event the Committee reaches a consensus on all or some of the matters before it, we will publish the Committee's report. A Third Notice of Proposed Rulemaking will also be issued requesting comment on the Committee's recommendations. If the Committee is not established or is established but is unable to reach any consensus, we will issue a public notice to establish a pleading cycle for comments and replies on the issues raised in this Notice.

IV. Procedural Matters

A. Ex Parte Rules - Non-restricted Proceeding

50. This Second Notice of Proposed Rulemaking proceeding is a non-restricted notice and comment proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission Rules. See generally 47 C.F.R. 1.1202, 1.1203, and 1.1206(a).

B. Initial Regulatory Flexibility Analysis

51. Reason for action. The purpose of this Second NPRM is to obtain comment on the proposed changes in fixed terrestrial and satellite service usage for the 28 GHz frequency band.

52. Objectives. The objective of this proposal is to consider methods for appropriating spectrum in the 28 GHz band among existing and potential service proponents.

53. Legal basis. The authority for this action is the Administrative Procedure Act, 5 U.S.C. 553; and Sections 4(i), 4(j), 301, 303(r) of the Communications Act of 1934 as amended, 47 U.S.C. 145, 301, and 303(r).

54. Reporting, recordkeeping and other compliance requirements. None.

55. Federal rules which overlap, duplicate or conflict with these rules. None.

56. Description, potential impact and number of small entities involved. Since the first NPRM was issued, we have been made aware of numerous small entities interested in manufacturing and/or providing customer services using a variety of new technologies being developed in the 28 GHz band. The proposals contemplated herein, to the extent they limit the previously proposed rule changes, could impact these small businesses. The

impact on small entities described in the NPRM released January 8, 1993, applies to this action as well.

57. Significant alternatives. Since the first NPRM was issued, we have been made aware of other firms researching the potential for new technology for video and other telecommunications services in the 28 GHz band. In addition, satellite entities may offer alternatives to some services that would be offered in this band. In part due to these alternatives, we are taking the instant action.

C. Comment Dates

58. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. Sections 1.415 and 1.419, interested parties may file comments at a time to be established by public notice if the Commission does not establish a Committee or if a Committee is established but does not reach any consensus.²⁴ To file formally in this proceeding, you must file an original and four copies of all comments, reply comments, and supporting comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. You should send comments and reply comments to the Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the FCC Reference Center, Room 239, of the Federal Communications Commission, 1919 M Street, N.W., Washington D.C. 20554.

59. For further information, contact Ms. Susan Magnotti, at (202) 634-1773, Domestic Facilities Division, Common Carrier Bureau.

V. Ordering Clauses

60. Accordingly, IT IS ORDERED That the Second Notice of Proposed Rulemaking is hereby adopted;

61. IT IS FURTHER ORDERED That a Public Notice pursuant to the Negotiated Rulemaking Act, 5 U.S.C. Sec. 581, SHALL BE ISSUED in accordance with the findings herein;

²⁴ As noted previously, if any Committee consensus is reached, a Third Notice of Proposed Rulemaking will be issued. See para. 49, supra.

62. IT IS FURTHER ORDERED That the Secretary shall mail a copy of this document to the Chief Counsel for Advocacy, Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
William F. Caton
Acting Secretary

APPENDIX

Parties filing comments:

Acor, Everett T., Jr.

Alex. Brown & Sons, Inc.

Alpha Industries, Inc.

Amby, Faith C.

America's Public Television Stations, Public Broadcasting Service,
Organization of State Broadcasting Executives and Southern
Educational Communications Association

Ameritech

Anchorage Telephone Utility

Baderwood International, Inc.

Bell Atlantic Personal Communications, Inc. on behalf of the Bell
Atlantic Companies, The New Jersey Bell Company, The Bell Telephone
Company of Pennsylvania, The Diamond State Telephone Company, The
Chesapeake and Potomac Telephone Companies, and Bell Atlantic
Enterprises International, Inc.

BellSouth Corporation, BellSouth Telecommunications, Inc., and
BellSouth Enterprises, Inc.

Box Springs Educators

Calling Communications Corporation

Cardiff Broadcasting Company

Caribbean Communications Corp. d/b/a St. Thomas-St. John Cable TV

Carney, Joseph D. & Associates

Catel Telecommunications

Cellular Television Associates, Inc.

Coalition for Wireless Cable

Cole, Raywid & Braverman

Competitive Cable Association

Cyrus Partnership

Dataflow Systems

Digital Microwave Corporation

Eagle Engineering & Communications Group, Inc.

Educational Parties (filing jointly): American Council on Education, Board on Distance Education and Telecommunications of the National Association of State Universities and Land Grant Colleges, Instructional Telecommunications Consortium of the American Association of Community Colleges, Western Cooperative for Educational Telecommunications, Arizona Board of Regents for Benefit of the University of Arizona, California State University, Alliance for Higher Education, Iowa Public Broadcasting Board, University of Maine at Augusta, University of Washington, University of Wisconsin System, Washington State University, South Carolina Educational Television Commission and Ana G. Mendez Educational Foundation

EMI Communications Corporation

Foresight Communications

GHz Equipment Company

Gilio, Robin V.

GTE Service Corporation

Guy, Frederick R.

Haddon, Perry W.

Hornby, Harold

Hughes Space and Communications Co. and Hughes Network Systems, Inc.

Joplin Beepers, Inc.

King Broadcasting Associates

Kingswood Associates

Linz, Robert M., P.E.

Levin, Michael H.

Loral Qualcomm Satellite Services, Inc.

M3 Illinois Telecommunications Corp.

M/A-COM, Inc.

Metrocom Telecasting

Mettler Communications, Inc.

Milani, Patricia B.

Motorola

Motorola Satellite Communications, Inc.

Multi-Micro, Inc.

National Aeronautics and Space Administration

National Association for the Advancement of Colored People

National Captioning Institute, Inc.

New York Department of Public Service

Norris Satellite Communications

NYNEX Mobile Communications Company

Pacific Telesis Group, Pacific Bell and Nevada Bell

RioVision of Texas, Inc.

Rochester Telephone Corporation

Rock Hill Telephone Company, Fort Mill Telephone Company and Lancaster Telephone Company

RSW Communications, Ltd.

Rumore, Victor

Seiter, Steven P.

Senvista General Partnership

Sprint Corporation on behalf of Sprint Communications Company L.P. and the United and Centel Telephone companies: Carolina Telephone and Telegraph Co., United Telephone - Southeast, Inc., United Telephone Company of the Carolinas, United Telephone Co. Southcentral Kansas, United Telephone Company of Eastern Kansas, United Telephone Company of Minnesota, United Telephone Company of